

**MUNICIPAL AND INDUSTRIAL
WATER SUPPLY AND USES
in the
BEAR RIVER BASIN**

(Data Collected for Calendar Year 1998)

Prepared by

**Utah Department of Natural Resources
Division of Water Resources**

APRIL 2001

ACKNOWLEDGMENTS

This water study was conducted under the direction of Lloyd H. Austin, assistant director, and supervised by Eric K. Klotz, chief, Resource Inventories and Special Studies Section, Utah State Division of Water Resources. Staff members assisting in the preparation of this report and/or in the data collection and analysis were Dallas Wall and Gregory Williams. Appreciation is expressed to the various water suppliers and the Division of Water Rights for supplying information for this report.

D. Larry Anderson, Director

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EXECUTIVE SUMMARY

This document describes the municipal and industrial (M&I) water supplies and uses for the Bear River Basin with data collected for the calendar year of 1998. All resultant information presented represents the water supply and demand conditions of 1998 only and may not be representative of the conditions of a “normal” year. Total M&I water supplies and uses for the basin are computed by tabulating the results of the basin’s four counties. These counties are Cache, Rich, and portions of Box Elder and Summit. The county data is compiled by meeting with and surveying each public community and non-community water system.

The basin’s maximum annual potable water supply under present conditions for Public Community Water Systems is 128,359 acre-feet. Springs account for 35 percent of this total, wells 64 percent, and surface sources one percent. The reliable system source capacity for these systems is 60,524 acre-feet. **Table I** presents this data.

TABLE I
BEAR RIVER BASIN
Maximum Culinary Water Supplies for Public Community Systems
(Units in Acre-Feet)

Source	Box Elder County	Cache County	Rich County	Summit County	Total
Springs	16,634.2	25,721.8	2,422.7	0.0	44,778.7
Wells	24,712.1	56,097.8	1,336.4	0.0	82,146.3
Surface	0.0	1,434.0	0.0	0.0	1,434.0
TOTALS	41,346.3	83,253.6	3,759.1	0.0	128,359.0
Reliable System Source Capacity	19,051.5	39,780.7	1,692.3	0.0	60,524.5

M&I water use can be divided into two categories: potable (culinary) and non-potable (secondary). Potable water is delivered by public community, public non-community, self-supplied industrial, and private domestic systems. Non-potable water uses include residential and institutional secondary water usually delivered by separate irrigation companies and secondary water used by self-supplied industries. **Table II** presents water use data for the potable and non-potable categories delivered by public community systems. The table shows that the residential indoor category accounts for 24 percent, residential outdoor 46 percent, commercial 11 percent, institutional 10 percent, and light industrial 9 percent of the total public community system water use (41,255 acre-feet) in the basin.

TABLE II
BEAR RIVER BASIN
Water Use for Public Community Systems
(Units in Acre-Feet)

Source	Box Elder County	Cache County	Rich County	Summit County	Total
<i>Potable Uses:</i>					
Residential Indoor	2,999.5	6,856.2	118.2	0.0	9,973.9
Residential Outdoor	4,729.4	10,692.6	508.3	0.0	15,930.3
Commercial	800.4	2,974.3	148.0	0.0	3,922.7
Institutional	1,096.7	1,384.4	43.5	0.0	2,524.6
Industrial/Stockwater	1,308.7	2,398.3	5.6	0.0	3,712.6
TOTAL CULINARY	10,934.7	24,305.8	823.6	0.0	36,064.1
<i>Non-Potable Uses:</i>					
Residential	755.4	2,391.6	19.7	0.0	3,166.7
Commercial	185.9	173.0	137.5	0.0	496.4
Institutional	593.7	907.0	27.5	0.0	1,528.2
Industrial/Stockwater	0.0	0.0	0.0	0.0	0.0
TOTAL SECONDARY	1,535.0	3,471.6	184.7	0.0	5,191.3
TOTAL WATER USE	12,469.7	27,777.4	1,008.3	0.0	41,255.4

Table III presents the total M&I water use in the Bear River Basin. Public community systems deliver the majority of the potable water in the basin. The table shows that the total potable M&I water use in 1998 is 42,624 acre-feet. Non-potable M&I water use for the basin is 7,201 acre-feet. Therefore, total M&I (potable and non-potable) water use in the basin is 49,825 acre-feet.

For 1998, population for public community systems in the Bear River Basin was approximately 126,418. Therefore, the residential potable per capita water use is 183 gallons per capita per day (gpcd). Non-potable water use amounts to 22 gpcd resulting in uses of 205 gpcd for residential purposes within the public community systems of the basin. By adding commercial, institutional and industrial uses, public community systems use is 255 gpcd for potable uses and 37 gpcd for non-potable uses for a total of 292 gpcd. Lastly, with a population of 130,352 (including the private domestic category), the total basin M&I per capita water use including all categories and types of systems is 341 gpcd.

TABLE III
BEAR RIVER BASIN
Total Municipal and Industrial Water Use for all Categories
(Units in Acre-Feet)

Source	Box Elder County	Cache County	Rich County	Summit County	Total
<i>Potable Suppliers:</i>					
Public Community Systems	10,934.7	24,305.8	823.6	0.0	36,064.1
Public Non-Community Systems	41.3	1,928.8	192.6	38.3	2,201.0
Self-Supplied Industries	14.7	844.2	0.0	0.0	858.9
Private Domestic	1,100.0	2,200.0	200.0	0.0	3,500.0
TOTAL CULINARY	12,090.7	29,278.8	1,216.2	38.3	42,624.0
<i>Non-Potable Suppliers:</i>					
Secondary Irrigation Companies	1,535.0	3,471.6	184.7	0.0	5,191.3
Non-Community Systems	26.4	876.0	0.0	100.0	1,002.4
Self-Supplied Industries	1,003.6	3.7	0.0	0.0	1,007.3
Private Domestic	0.0	0.0	0.0	0.0	0.0
TOTAL SECONDARY	2,565.0	4,351.3	184.7	100.0	7,201.0
TOTAL WATER USE	14,655.7	33,630.1	1,400.9	138.3	49,825.0

INTRODUCTION

Authority

The Utah Division of Water Resources has the overall responsibility for completing studies, investigations, and plans to assist the responsible development and utilization of the water resources of the state of Utah. The State Water Plan, prepared and distributed in early 1990, provided the foundation and overall direction to establish and implement the state policy framework of water management. As part of the state water planning process, detailed plans are prepared for the 11 hydrologic basins in the state. The Bear River Basin is one of these 11 reports. Each basin water plan identifies potential conservation and development projects and describes alternatives to satisfy the problems, needs, and demands. As part of this effort, background data reports are completed for each river basin. These include a water-related land use report and a water budget report.

Scope

The subject of this data report is a determination of the present municipal and industrial (M&I) water supplies and uses within this basin. The data presented in these reports will be used in the State Water Plan for the Bear River Basin as well as other division reports and studies. The basin is shown in **Figure 1**. Some of the information considered includes related investigations recently completed by the Division of Water Resources and the Division of Water Rights.

Data Collection

This study was begun in January 2000 by Division staff. The *1998 Municipal and Industrial Water Use Forms*, distributed by the Division of Water Rights, in cooperation with the Division of Water Resources and the Division of Drinking Water,

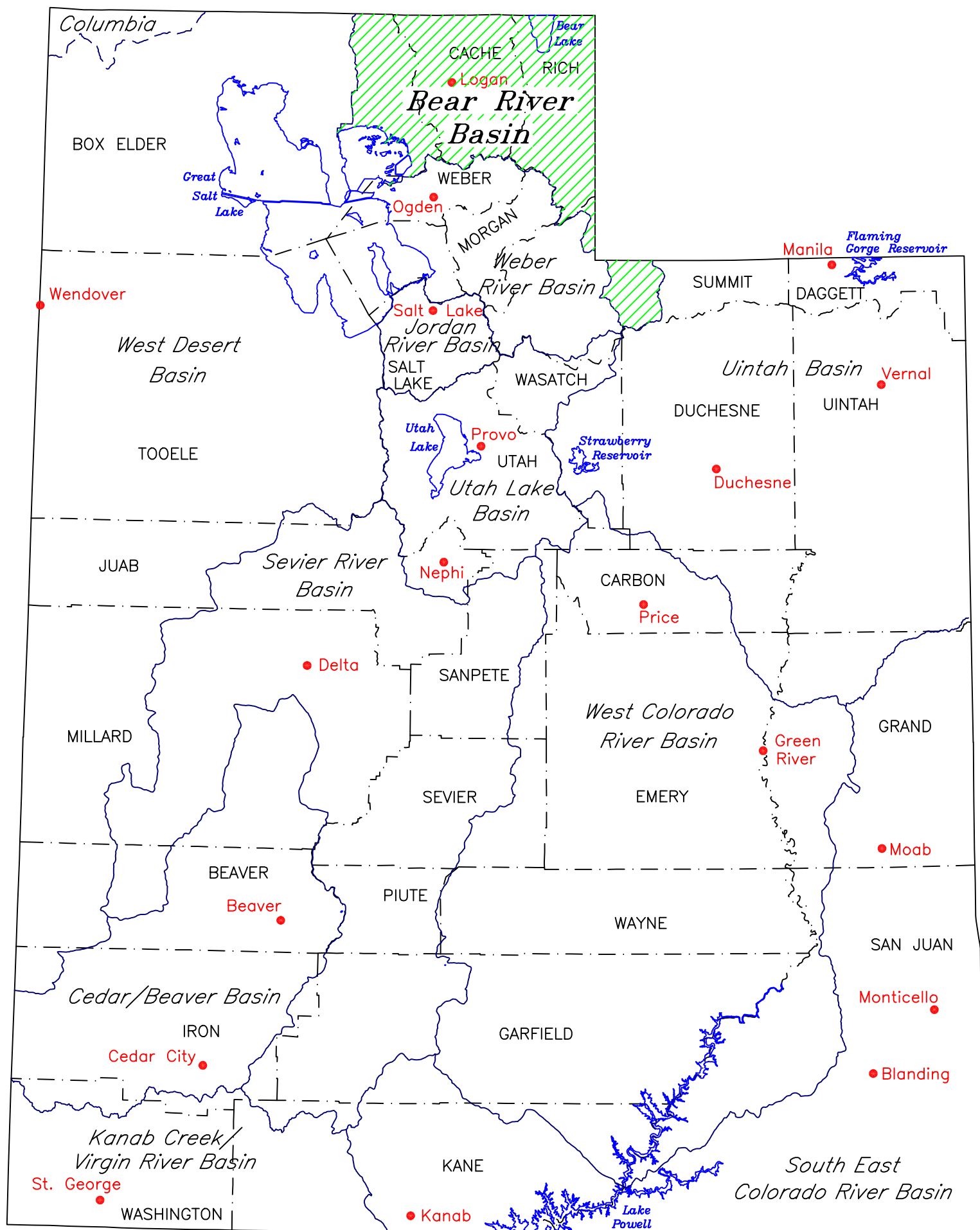


Figure 1. Location of the Bear River Basin.

were used and is the basis for the study. In all counties the data collection process is as described in the following section, *Water Supply and Use Methodology*. Water rights discussions presented herein were prepared based on information provided by Bob Fatheringham, area engineer of the State Engineer's Office, who is responsible for the Bear River Basin.

General Description of the Basin

The Bear River Basin encompasses a total of 7,583 square miles of varied terrain in the three western states of Utah, Wyoming, and Idaho. The Bear River itself begins in the western end of the Uinta Mountain Range in Summit County, Utah at elevations over 13,000 feet above mean sea level. As the river leaves this headwater area, it traverses through Wyoming with a drainage basin that widens to a gently sloping valley at about 7,000 feet elevation. This valley extends northward almost 100 miles through Wyoming, Utah (Rich County), back through Wyoming, then westward into Idaho and the Bear Lake Valley.

The Bear Lake Valley extends into Utah, with the southern end being inundated by Bear Lake, one of the more prominent hydrologic features of the basin, covering approximately 110 square miles in both Utah and Idaho. The Bear River, however, flows northward from the valley through miles of hilly grazing land in Idaho until entering a deep, narrow channel near Soda Springs, Idaho. Here a hydroelectric power plant has been constructed on the river, which then continues its flow into the agricultural area known as Gem Valley. Although the river historically flowed through Gem Valley to the north, a lava flow redirected the river to the south on its present course towards Utah.

Once again entering Utah, where it began, the Bear River flows into Cache Valley and combines with several tributaries, including the Cub and Logan Rivers, Blacksmith Fork River, and the Little Bear River. This combined flow then runs through a narrow gorge in Box Elder County of Utah where another hydroelectric power plant is located. Below the power plant, the river merges with the Malad River just before entering the

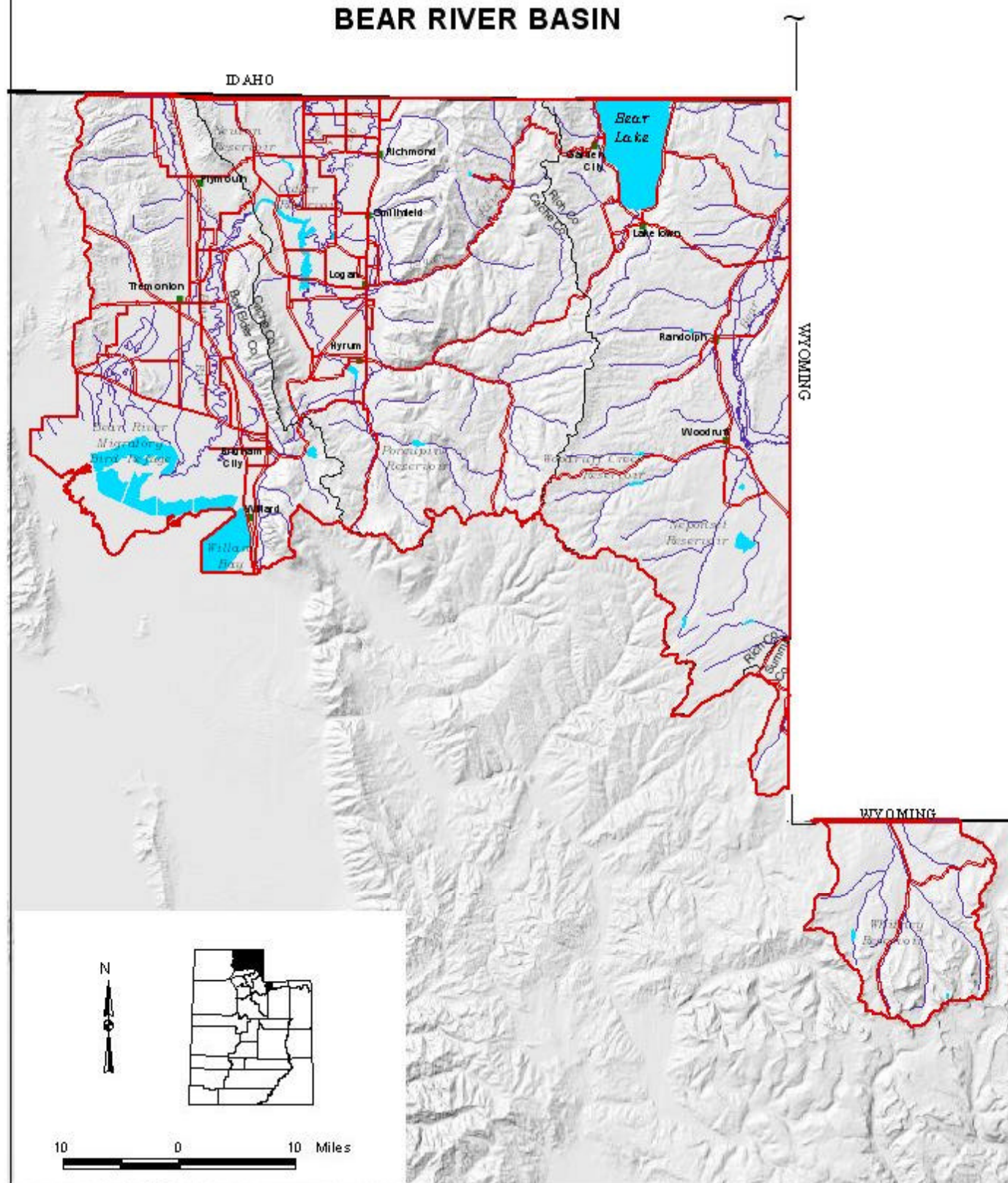
Bear River Bay. Of note, this bay is the largest contiguous natural fresh water bay in the United States and includes the Bear River Migratory Bird Refuge, a federally controlled waterfowl management area. In the scope of this report, only the portion of the Bear River Basin that lies within the state of Utah is considered. The Utah portion consists of all of Cache and Rich counties, the eastern quarter of Box Elder County, and a small area of Summit County.

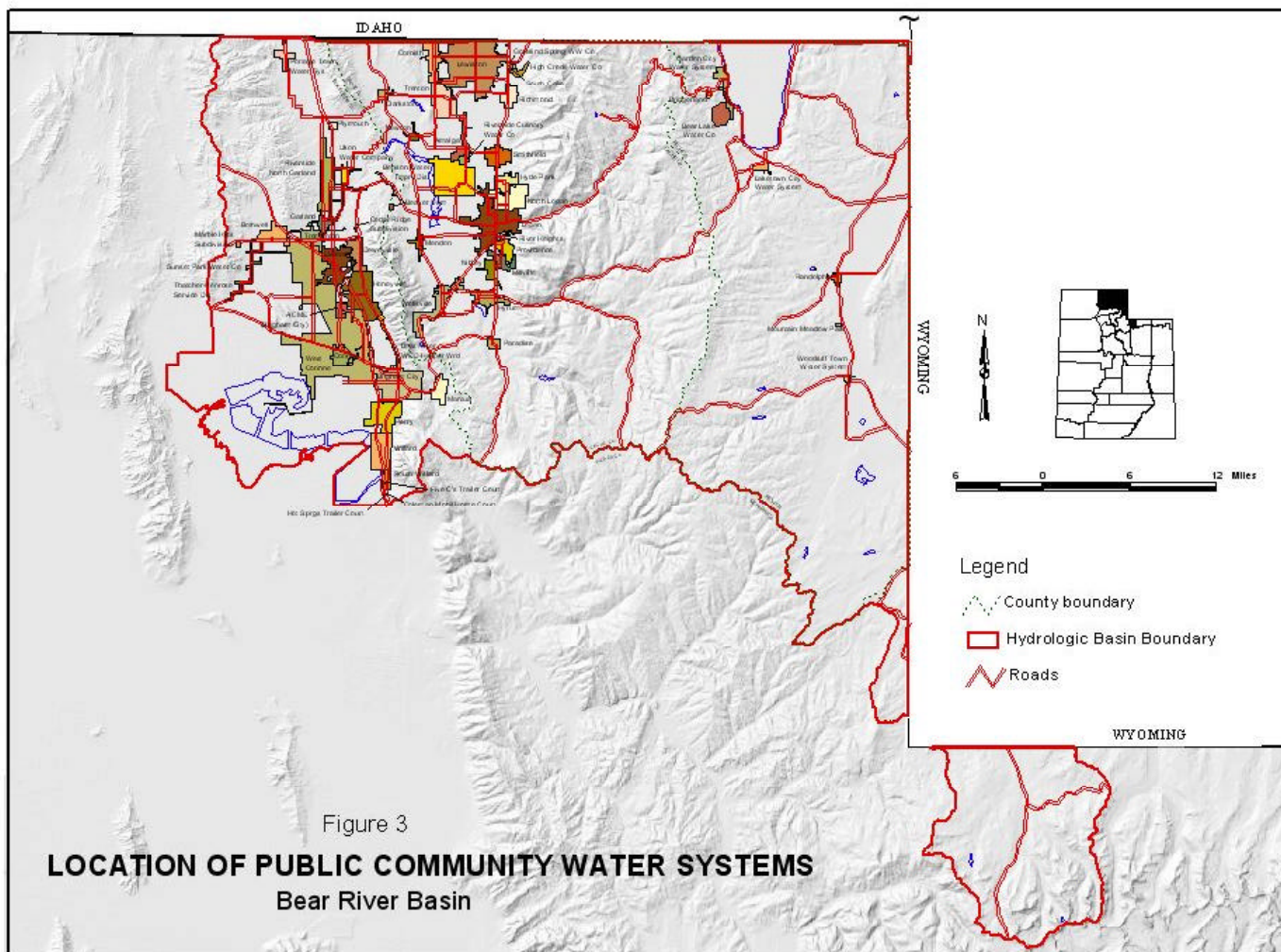
More specifically, the border of the report area is the Wyoming and Idaho state borders to the west and north, the crest of the West and Blue Spring Hills running south to the northern end of the Bear River Bay (including Willard Bay), continuing easterly along the southern boundaries of Cache and Rich counties. Diverting from the Rich county boundary just west of the Wyoming state border, the basin boundary then encircles the head water area of the Bear River in the Uinta Mountains and ends at the east-west Wyoming and Utah state border in Summit county. The borders of this area in Summit county coincide with the hydrologic boundaries of the Weber and Provo rivers, as well as the Colorado -Great Basin Divide. See **Figure 2** for a detailed map of the basin.

The Bear River Basin has 56 public community water systems. These water systems serve 126,418 people (most all of the 130,352 total basin population). See **Figure 3** for the location of these systems. Additionally, the basin has 55 public non-community water systems. These systems serve Federal Forest Service campgrounds, Bear Lake State Park facilities, isolated commercial and institutional establishments, summer home developments, roadside rest areas and parks. The basin also has six self-supplied industries, five of which are classified as non-community, non-transient water systems.

M&I water use is steadily increasing within the basin. The Logan area in Cache County and the Brigham City area of Box Elder County are experiencing the greatest population growth. The migration of the Wasatch Front population growth and increasing enrollment at Utah State University are driving most of this growth. This trend is likely to continue well into the future.

BEAR RIVER BASIN





WATER SUPPLY AND USE METHODOLOGY

Background

Over the past 40 years the Division of Water Resources has employed various procedures to obtain needed M&I data. In recent years, these procedures have become increasingly more comprehensive. When the division began water planning in the 1960's, available data consisted mainly of supplies and uses for the entire state. At that time, agriculture uses far exceeded M&I uses in Utah. M&I water use was generally calculated by using available or estimated per capita rates and multiplied by the census population data.

By the early 1980's, M&I diversions made up a larger percent of all statewide water uses and the entire water community began to increase their focus on M&I water supplies and uses. The Division of Water Rights launched a program to collect yearly, statewide M&I data. The procedure involved mailing a survey designed to query each major public water supplier about their sources of water supply. In addition the United States Geological Survey (USGS) began M&I water use studies. The division relied on both of these data sources in its planning efforts by the late 1980's.

With the preparation of the State Water Plan Basin reports, the division realized the need to check and improve the quality and quantity of the available data through two methods. The first was to join with the Division of Water Rights to improve their M&I data collection program. Secondly, the division began exploring the accuracy of the data through yearly field surveys described in the following four sections.

Present Methodology for Community Water Systems

Each year, division staff targets a particular hydrologic basin or study area for M&I water supply and use analysis. The division of Water Rights' most recent water use form is the primary tool for these analyses. As an example, the following three pages

exhibit the 1998 water use form submitted by the Smithfield Municipal Water System.

Division staff contact the manager or operator of each community water system (as defined by the Division of Drinking Water) to schedule a data analysis meeting. At times, operators can inadvertently omit necessary information on their yearly form. During such meetings, division staff attempts to retrieve missing data as well as obtain an overall feeling of the supplies and demands of the water system, in case estimates are necessary. A secondary objective of these meetings is to educate the operator or manager to more accurately complete the water use data form. Division staff supply a new form to those systems that either didn't receive one or didn't return one. This methodology has been used since 1994, and all of the community water systems for the various basins studied have provided the necessary M&I water supply and use data.

During the analysis, division staff determines the system's water supply and use. Two factors define water supply: 1) maximum water supply available under present conditions and 2) reliable system source capacity. The maximum water supply available under present conditions is defined as the total water resource which is presently developed. The resource is limited by either a mechanical constraint (such as pump capacity or pipe size), a hydrologic constraint (such as reliable streamflow or groundwater safe yield) or a legal constraint (such as a water right or contract). The lesser amount of these three constraints is considered in this study as the maximum water supply available under present conditions. Determination of well pump capacities, spring flow estimates, treatment plant capacities, and water right information aid in the calculation of this value. It should be noted here that due to the complexity of water rights, contracts, exchanges, etc., a detailed search of water right limitations associated with each entity is not within the scope of this study.

Informal jointly requested by:

Utah Division of Water Resources, 538-7264;
Division of Drinking Water, 536-4200; and
Division of Water Rights, 538-7392.

UTAH WATER USE DATA FORM

DATA FOR 1998

Return completed form to:
Utah Division of Water Rights
PO Box 146300
Salt Lake City, UT 84114-6300

System Name: Smithfield Municipal Water System
Address: P.O. Box 96, 69 North Main
Smithfield, UT 84335-9600

Contact Person: Jim Gass, City Engineer
Form filled out by: JIM GASS

Population Served: 7420 ID #: 1303/0302
Total No. Connections: 1789 County: Cache
Average Lot Size Served: 0.30 acre(s).
Estimated Percent of Lot Irrigated 60 %
Phone Number: (801)563-6226
Phone Number: 435 563-6226

RECEIVED

I. STORAGE INVENTORY: Total treated storage capacity: 2,500,000 in gallons. Number of Tanks: 3

MAR 08 1998

II. SOURCE INVENTORY:

1 Source Name: Smithfield Canyon Spgs.
Method of Measurement: ☒ Master Meter, ☐ Estimate, ☐ Other
Units of Measurement: MG

Type: SP Location: Sec 9, T13N, R2E, SLB&M
WR Number: 25-8107, EX-1401

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
45.5	47.8	64.4	74.5	76.4	75.0	76.7	73.1	61.2	57.4	48.8	52.8	753.6

Are there any spills/overflow? ☒ Yes, ☐ No If yes, estimate annual quantity N/A. Where is source measured? ☒ Before overflow, ☐ After overflow
When do spills/overflow occur? SPRING, FALL, WINTER Are spills/overflow included in the quantities reported? ☒ Yes ☐ No

2 Source Name: Miles Spg.

Method of Measurement: ☐ Master Meter, ☒ Estimate, ☐ Other
Units of Measurement: MG

Type: SP Location: Sec 17, T13N, R1E, SLB&M
WR Number: EX-1401

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
11.8	12.5	16.8	19.5	19.9	19.6	20.0	19.1	16.0	15.0	12.8	11.9	194.9

Are there any spills/overflow? ☒ Yes, ☐ No If yes, estimate annual quantity N/A. Where is source measured? ☐ Before overflow, ☐ After overflow
When do spills/overflow occur? SPRING, FALL, WINTER Are spills/overflow included in the quantities reported? ☒ Yes ☐ No

3 Source Name: Peterson Spg.

Method of Measurement: ☐ Master Meter, ☒ Estimate, ☐ Other
Units of Measurement: MG

Type: SP Location: Sec 24, T13N, R1E, SLB&M
WR Number: 25-6623

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
5.0	5.3	7.1	8.2	8.4	7.6	7.5	7.1	6.8	6.4	5.4	4.9	79.7

Are there any spills/overflow? ☒ Yes, ☐ No If yes, estimate annual quantity N/A. Where is source measured? ☒ Before overflow, ☐ After overflow
When do spills/overflow occur? SPRING, FALL, WINTER Are spills/overflow included in the quantities reported? ☒ Yes ☐ No

4 Source Name: Smithfield Well Type: WE Location: Sec T13N, R1E, SUB&M WR Number: 25-4791, 25-6373
 Method of Measurement: ☒ Master Meter, [] Estimate, [] Other
 Units of Measurement: MG Rated Pump Capacity: 1500 MG gpm, [] cfs
 Date of Last Pump Test UNKNOWN Yield of Well [] gpm, [] cfs

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL
							33.7	23.5	11.0	0.10			68.3

** If you are using other sources which are not shown above, please enter the appropriate data in the space provided below. **

5 Source Name: _____ Type: _____ Location: _____
 Method of Measurement: [] Master Meter, [] Estimate, [] Other
 Units of Measurement: _____

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

6 Source Name: _____ Type: _____ Location: _____
 Method of Measurement: [] Master Meter, [] Estimate, [] Other
 Units of Measurement: _____

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

7 Source Name: _____ Type: _____ Location: _____
 Method of Measurement: [] Master Meter, [] Estimate, [] Other
 Units of Measurement: _____

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

8 Source Name: _____ Type: _____ Location: _____
 Method of Measurement: [] Master Meter, [] Estimate, [] Other
 Units of Measurement: _____

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY TOTAL

SOURCE COMMENTS: Water supply conditions were: [] Above normal, [] Normal, [] Below normal

III. h. -R USE BREAKDOWN:

(Please use sum of readings from individual meters. If quantities are not known, please estimate percentages. See instructions for definition of uses shown in bold.)

Units of Measurement: MG BST. ONLY

Source of data:	[] Meter readings at the source;	<input checked="" type="checkbox"/> Meter readings at individual connections; or <input checked="" type="checkbox"/> Estimated	
Residential:	Annual quantity of water delivered for residential purposes	<u>347.1</u>	Total number of residential connections <u>1909</u>
Commercial:	Annual quantity of water delivered for commercial purposes	<u>52.2</u>	Total number of commercial connections <u>62</u>
Industrial:	Annual quantity of water delivered for industrial purposes	<u>2.8</u>	Total number of industrial connections <u>4</u>
Institutional:	Annual quantity of water delivered for institutional purposes	<u>47.8</u>	Total number of institutional connections <u>12</u>
Stockwatering:	Annual quantity of water delivered for stockwatering purposes		Total number of stockwatering connections <u>0</u>
Unmetered:	Annual quantity of water delivered by unmetered connections		Total number of unmetered connections <u>N/A</u>
Wholesale:	Annual quantity of water delivered to other systems		Please attach a listing of those supplied.
Other Uses:	Annual quantity of water delivered for other purposes		Total number of other connections
Describe other uses			

IV. IRRIGATION SYSTEM

(Separate lawn and garden irrigation system, whether controlled by the drinking water supplier or not)

Is your area served by a separate irrigation water system? ☒ Yes, [] No If yes, please provide the following information:

What percent of your customers are served by a separate irrigation system? 60 % The water is delivered 3 % by ditch & 92 % by pressurized system

If system is operated by another entity, please give name of company, contact person & phone number:

SMITHFIELD IRR SYSTEM
JEFF GITHINS, PRESIDENT

Quantity of water delivered by the irrigation system: Units of measurement: _____

Total water delivered: _____

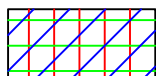
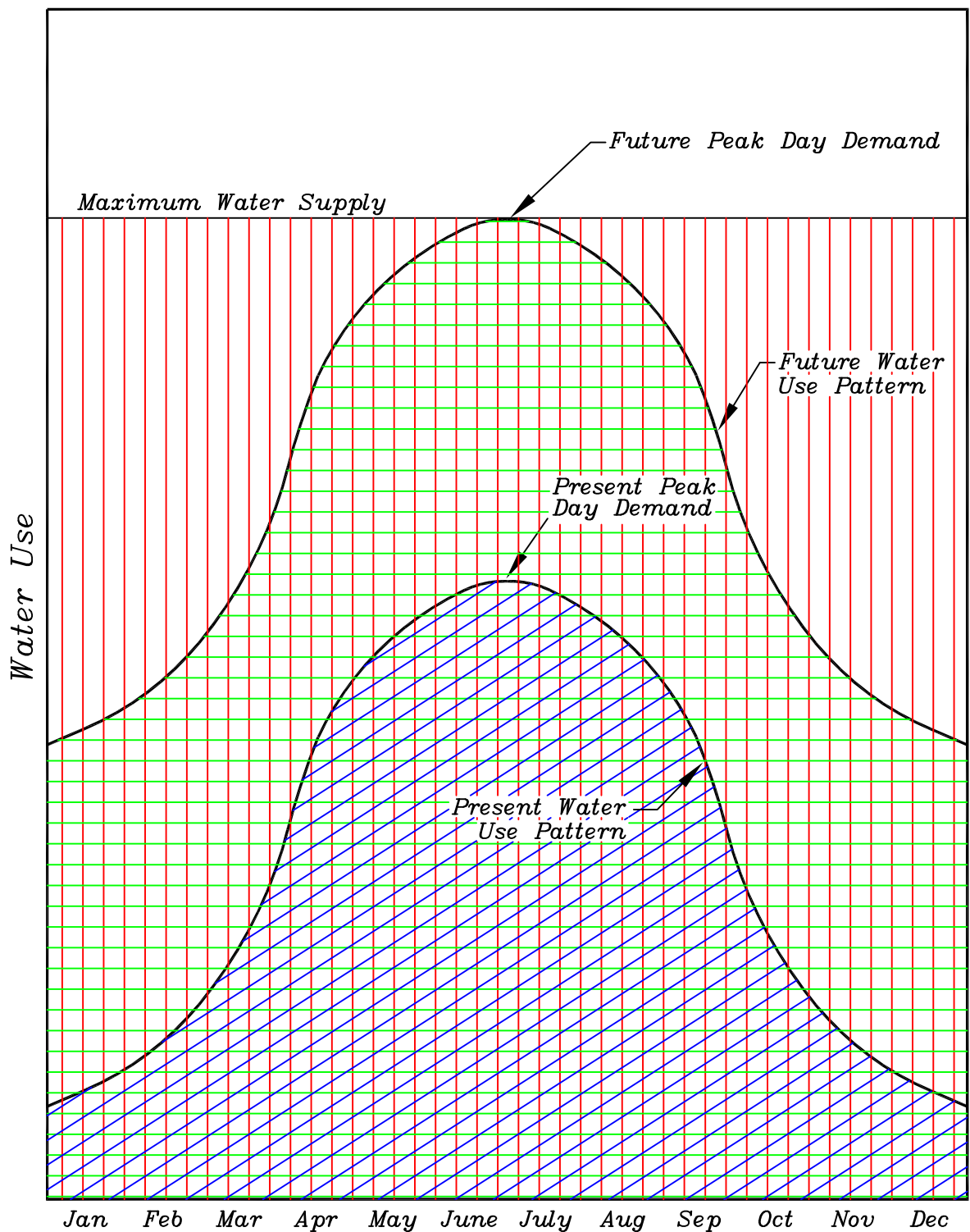
Estimated acreage served by the irrigation/secondary system: _____ acres.

The reliable system source capacity is defined as the capacity to meet peak day demands, expressed as an annual volume. The maximum water supply available under present conditions (defined earlier) deals with an average annual volume. Many water supply components in M&I systems (treatment plants, storage facilities, pump motors, etc.) are sized using demand during a peak 24-hour period. The relationship between average day and peak day demand is important. It is for this reason that a more reliable system source capacity is determined to accurately reflect future M&I water conditions for each system. The relationship used is:

$$P_D = - 49.4 + 2.5 A_D$$

where P_D is peak day demand and A_D is average daily demand. For each public community system, the average per capita use (described later) is used in the relationship above to determine a peak factor, and the maximum water supply available under present conditions is used to determine a peak day supply. These two values are then used in calculating the reliable system source capacity which represents the systems' annual maximum water supply's ability to meet peak day demand conditions. It also represents the volume of water which, when divided by the average annual per capita water use, gives the population that can be reliably served by the present system sources.

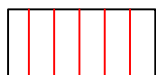
Figure 4 graphically presents the relationship between maximum water supply and reliable system source capacity. Current water use is shown in the figure as the volume under the lower curve. The future water use is shown as the volume under the upper curve. The maximum water supply under present conditions is shown by the volume under the upper line. Because this amount is associated with a maximum daily flow rate (limited by the water right or system capacity), the line in the figure must pass through the peak day demand point on the future water use curve. It is for this reason (and the fact that most culinary water system storage tanks are designed to store only about one days' worth of water demand) that not all of the maximum water supply is available to meet future water needs. Therefore, the reliable system source capacity, which is equal to the volume under the future water use curve, is a better indication for meeting future water needs. For most systems, this value is about half of the maximum water supply.



Present Yearly Water Use (Volume under curve)



Present Reliable System Source Capacity/Future Water Use (Volume under curve)
When this volume is divided by annual per capita water use, this yields the population that can be reliably served.



Maximum Source Capacity Available Under Present Conditions (Volume under line)

Figure 4. Water Supply and Use Hydrograph.

The reliable system source capacity is valuable in determining future water capacities of the particular community water system sources (wells, springs, etc.). Although future water projections are not addressed in this study, the data provided here is used in the state water plans, which the division is formulating for each major hydrologic basin in the state. These basin plans deal with considerable detail about future water demands and supplies.

The last part of the data collection process is to determine the present water use for each community water system. Present water use, as defined herein, includes the developed water which is actually diverted into the distribution system from surface or subsurface sources. The data collected represents the latest available complete calendar year from when the study is started. Water use is divided into four categories: residential, commercial, institutional and industrial. For comparative purposes the division chose these categories to correlate with the United States Geological Survey's (USGS) categories of domestic, commercial, industrial, and mining. The division's residential category is equivalent to the USGS domestic category and includes water used in residential homes for inside and outside uses. The USGS commercial category is equivalent to the division's combined commercial and institutional categories. The commercial category includes water use for retail establishments and businesses. The institutional category includes water use for government facilities, military facilities, schools, hospitals, churches, parks, cemeteries, golf courses, etc. The division's industrial category is equivalent to the combined USGS categories of industrial and mining which includes a wide variety of water uses associated with businesses that produce a specific product.

Residential Use

From the system operator, the staff collects data about the number of residential connections and the amount of water used by those connections. Water use in this category is divided into three subcategories: culinary-outside, culinary-inside, and secondary-outside use. The first step in calculating the amount of water used in each of these subcategories is determining the amount of indoor water use. When the individual water meter readings are available, indoor water use can be estimated by looking at several individual home's winter meter readings, totaling the water use, and dividing it by the number of households and/or residents. If this method yields an unreasonable value, then the staff will use information from the Division's December 2000 report of *Identifying Residential Water Use*. The report contains a graph that indicates the relationship of persons per household and the appropriate indoor water use in gallons per capita per day (GPCD). The persons per household data is obtained from the Utah State Governor's Office of Planning and Budget. This data is retrieved for each county and used with the above mentioned graph to obtain a GPCD value. This value is then multiplied by the community water system's customer population to yield the water system's total indoor water use.

Once indoor water use has been determined for the year, it is then subtracted from the total year's residential water use given by the system's operator. The result represents the amount of water used during the summer months for outdoor applications. This amount is then checked with the value calculated by using the average lot size within the water system's service area, percentage that is irrigated, the irrigation efficiency, and the consumptive water use for the type of landscaping in the area.

Commercial Use

For most systems, the system operator can separate metered commercial water use data from the total water use. In cases where this data is not available or is extremely difficult to obtain, the division staff attempts to estimate commercial water

use by inventorying commercial businesses in the area and using published commercial water use estimates. These publications come from the Division of Drinking Water and from reports published by the Utah State Water Lab. In some rural communities where there is a relatively small number of commercial connections, the businesses are visited by division staff and asked about their water use.

Institutional Use

Institutional water use is water used for city, county, state and federal government facilities, parks, golf courses, schools, hospitals, churches, military facilities, fire hydrant testing and other municipal losses in the water system. Because this water use is rarely metered, the process to acquire this data is a difficult one. Again, the system operator is asked to provide information about city facilities such as number and size of parks, schools, churches, and golf courses. Water right-duty rates for the area are used to calculate the amount of water these areas use. Also, estimates are made of leakage and testing of water system facilities and included in this category.

Industrial Use

Industrial use within community water systems is acquired with the same process used to obtain commercial water use data discussed earlier. Industrial water use is defined as water used in the production of a product. Therefore, such commercial establishments as dairies and mink farms are included in this category, provided a community system serves them.

Present Methodology for Non-Community Water Systems

Division staff attempts to contact each non-community system and make a personal visit. These systems rarely meter their water use, so estimates are made by division staff as to their actual annual water use. Questions are asked to determine type of facility, population served, water source information, irrigation of outside areas,

etc. This data, along with other water -related publications, are used to determine water use. The maximum water supply for these systems is often not available and is not in the scope of this study.

Present Methodology for Self-Supplied Industrial Water Systems

For self-supplied industries, water use is acquired by using data given on the Division of Water Rights Industrial Water Use Form. The Division of Water Rights collects annual water use data from most of the major self-supplied industrial water users in the state. This data is confidential. Therefore, the data presented in this M&I study is only given as county totals. Again, the maximum water supply is often not available and is not within the scope of this study.

Present Methodology for Private Domestic Water Systems

Private domestic systems are residences that are not connected to any public community or non-community water system. They are usually supplied by individual wells. The water use data for this category is acquired by taking the State Office of Budget county population data and subtracting the population served by community water systems. The remainder is the population that is served by private domestic systems. A reasonable per capita rate (usually determined from the residential per capita rates from nearby community systems) is applied to this population to determine the total water use by private domestic systems. Since the maximum water supply for private wells is really an analysis of the total groundwater reservoir/recharge area, it is not within the scope of this study.

DEFINITIONS OF WATER TERMS

Some water terms peculiar to the water industry are briefly defined in order to better understand the information presented.

Water Supply Terms

Water is supplied by a variety of systems for many users. The general term supply is defined as the amount of water available. Most water supply systems are owned by a municipality, but in some cases the owner/operator is a private company or a state or federal agency. Thus, a "public" water supply may be either publicly or privately owned. Also, systems may supply treated or untreated water.

Maximum Water Supply Available Under Present Conditions - The annual volume of water which is the lesser of the hydrologic capacity of the water source, the physical capacity of the water system, or the use allowed by the water right. See **Figure 4**.

Reliable System Source Capacity - The actual annual quantity of the maximum water supply that is available to meet peak demands. When this number is divided by the average per capita usage, the resulting number represents the maximum population that the water source can serve. See **Figure 4**.

Municipal Water Supply - A supply that provides potable (culinary) water for residential, commercial, and institutional uses. The terms municipal, community and city are often used interchangeably.

Municipal and Industrial Water Supply - Includes all water (potable and non-potable) supplied for residential, commercial, institutional, light industry, and large self-supplied industries. This supply is available from public community systems, public non-community (transient and non-transient) system, self-supplied industrial systems, unregulated Indian systems and private wells.

Potable Water Supply - Water meeting all applicable safe drinking water requirements for residential, commercial, institutional and industrial uses. Sometimes referred to as culinary water supply.

Non -Potable Water Supply - Water not meeting safe drinking water requirements. Secondary irrigation companies and self-supplied industries supply this water. Sometimes referred to as non-culinary water supply, but usually referred to as secondary water.

Public Community Water Supply - Includes potable water supplied by either privately or publicly owned community systems which serve at least 15 service connections or 25 individuals with year round useage. Water from public community supplies may be used for residential, commercial, institutional, and industrial purposes. This can include both indoor and outdoor uses.

Public Non-Community Water Supply - Includes potable water supplied by either privately or publicly owned systems of two types; transient and non-transient. Transient systems are systems that do not serve 25 of the same non-resident persons per day for more than six months per year. Examples include campgrounds, RV parks, restaurants, convenience stores, etc. Non-transient systems are systems that regularly serve 25 of the same non-resident persons per day for more than six months per year. Examples include churches, schools and industries. This report combines transient and non-transient systems together and calls them all public non-community systems. Industries are reported under self-supplied industries.

Secondary Water Supply - Pressurized or open ditch water supply systems that supply untreated water for irrigation of privately and publicly owned lawns, gardens, parks, cemeteries, golf courses and other open areas. These systems, sometimes called "dual" water systems, are installed to provide an alternative to irrigating with culinary water for these outdoor areas. This supply is often provided by irrigation companies. Self-supplied industries can also use secondary water for industrial processes.

Self-supplied Industrial Supply - Includes potable or non-potable water supplied by individual privately owned industries usually from their own wells or springs.

Water Use Terms

Water is used in a variety of ways and for many purposes. Water is often said to be "used" when it is diverted, demanded, withdrawn, depleted or consumed. But it is also "used" in place for such things as fish and wildlife habitat, recreation and hydropower production. The word *use* can be inserted where the word *supply* is written in most of the previous water supply terms to define the current demand associated with those definitions. Some additional water use terms are as follows:

Commercial Use - Uses normally associated with small business operations which may include drinking water, food preparation, personal sanitation, facility cleaning and maintenance and irrigation of facility landscapes. Retail businesses, restaurants and hotels are some examples.

Industrial Use - Uses associated with the manufacturing or production of products. The volume of water used by industrial businesses can be considerably greater than water used by commercial businesses. Manufacturing plants, oil and gas producers, mining companies, milk farms and dairies are some examples.

Institutional Use - Uses normally associated with general operation of various public agencies and institutions including drinking water, personal sanitation, facility cleaning and maintenance and irrigation of parks, cemeteries, playgrounds, recreational areas, golf courses, and other facilities. Many times the amount used by cities for outside irrigation of public areas is not metered.

Municipal and Industrial (M&I) Use - Term includes all residential, commercial, institutional, and industrial uses. It includes total uses (potable and non-potable) supplied by public water systems (community and non-community), self-supplied

industries, private domestic systems, and secondary irrigation companies.

Private-Domestic Use - Includes water from private wells or springs for use in individual homes, usually in rural areas not accessible to public water supply systems.

Residential Use - Water use associated with residential cooking, drinking water, washing clothes, personal grooming and sanitation, irrigation of lawns, gardens and landscapes, and miscellaneous inside and outside cleaning. Single family homes, apartments, duplexes and condominiums are some examples.

Other Water Terms

Consumption - Water evaporated, transpired or irreversibly bound in either a physical, chemical or biological process.

Consumptive Use - Losses of water brought about by human endeavors when used for residential, commercial, institutional, industrial, agricultural, power generation, and recreation. Naturally occurring vegetation and fish and wildlife also consumptively use water.

Depletion - Water lost or made unavailable for return to a given designated area, river system or basin. It is intended to represent the net loss to a system. The terms consumption and depletion are often used interchangeably but are not the same. For example, water exported from a basin is depletion to the basin system but is not consumed in the basin. The exported water is available for use in another system. Water diverted to irrigated crops in a given system, but not returned for later use, is depletion. Precipitation that falls on irrigated crops is not considered a part of the supply like surface water and groundwater diversions. For this reason, precipitation falling on and consumed by irrigated crops is not considered as being a depletion to the system.

Diversion - Water diverted from supply sources such as streams, lakes, reservoirs or groundwater for a variety of uses including cropland irrigation, residential, commercial, institutional and industrial. The terms diversion and withdrawal are often used interchangeably.

Withdrawal - Water withdrawn from supply sources such as lakes, streams, reservoirs or groundwater. This term is normally used in association with groundwater withdrawal.

WATER RIGHTS IN THE BEAR RIVER BASIN

Any development on the Bear River must conform to established water rights and the Amended Bear River Compact. The State Engineer is currently adjudicating water in the Bear River Basin. The Bear River Compact was approved in 1958 and amended in 1980. An interagency, interstate commission was created to administer provisions of the compact. The 1980 amended compact provides for the protection of all prior water rights applied to beneficial use as of January 1, 1976, and the protection of all water rights granted under the 1958 compact. The 1980 amended compact also includes groundwater development allocations, additional storage rights to all three states above Bear Lake, and allocation of the remaining water below Bear Lake between the states of Utah and Idaho.

Although a detailed analysis of water rights is not within the scope of this report, brief overview statements of the water rights status for each county are listed below. Each statement is intended to only generally explain water right regulations in the Bear River Basin pertaining to M&I uses. For more detailed and current water right regulations in the area, contact the Utah State Division of Water Rights.

Box Elder County

This area is only conditionally open to new groundwater appropriations for any purpose. Each application will be carefully reviewed, particularly as it may impact on existing water rights. New applications are routinely protested by the Bear River Bird Refuge to insure that the necessary water to maintain the condition of the area is available.

Cache County

This area is only open to new groundwater appropriations that comply with the Cache Valley Ground Water Management Plan of 1999, as well as the Bear River Compact of 1958 and its amendments of 1980. The recently enacted Mangement Plan

allows an additional 25,000 acre-feet/year of potential ground-water withdrawals. This includes appropriations for individual domestic use up to 1.73 acre-feet/year, per point of diversion. Applications for larger amounts of water cannot impair any prior rights or there must be compensation, such as the replacement of adequate water to the affected system. There are other conditions which augment, not replace, any and all prior agreements. As discussed above, the 1980 amendments of the Bear River Compact protect all rights put to beneficial use prior to 1976 and all original rights of the 1958 agreement, whether currently in beneficial use or not.

Rich County

This area is open for new applications for appropriation of M&I water rights, provided all conditions of the Bear River Compact and its amendments are met.

Summit County

The Summit County area of the Bear River Basin is currently closed to all M&I applications for appropriation of water rights and will likely remain closed.

BOX ELDER COUNTY M&I WATER SUPPLIES AND USES

The Bear River Basin portion of Box Elder County includes the incorporated communities of Bear River, Brigham, Corinne, Honeyville, Perry and Tremonton Cities, as well as the towns of Deweyville, Elwood, Fielding, Mantua, Plymouth, and Portage. Within this area are 27 public community water systems and five public non-community water systems. Location of the public community water systems are shown in **Figure 5**.

The Bear River Water Conservancy District (BRWCD), created in 1988 by court decree, is a wholesaler of water. BRWCD also retails water to the small community water system of Harper Ward, supplied under contract with Brigham City from a separate spring source. The main source of water for the BRWCD is a well located in the Bothwell Pocket area, northwest of Tremonton. Currently, four separate public community water systems (Riverside/North Garland, Thatcher-Penrose, Tremonton, and Ukon) have contracts with the district for a portion of their water supply. The BRWCD has future plans and available water rights to supply more communities in Box Elder, as well as Cache County. A schematic drawing of the BRWCD system is shown in **Figure 6**.

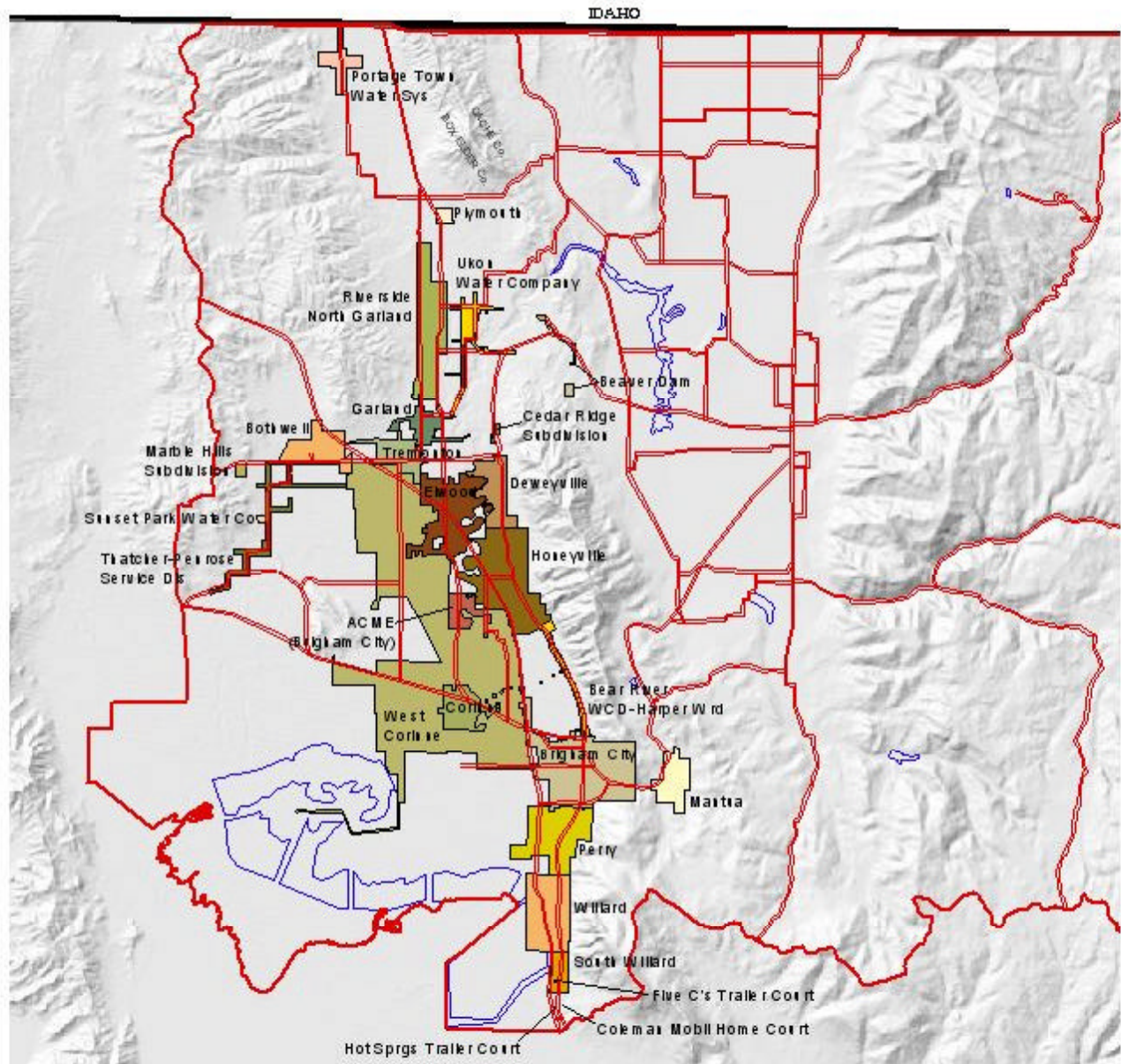
Table 1 shows that the maximum annual water supply for public community water systems in this portion of Box Elder County is 41,346 acre-feet: 16,634 acre-feet from springs and 24,712 acre-feet from wells. The reliable system source capacity is less than half that amount at 19,051 acre-feet.

Table 2 shows this along with a breakdown of the potable water use for each public community water system. The table also shows that for this portion of Box Elder County, the current annual potable water use of 10,935 acre-feet is 57 percent of the reliable supply of 19,051 acre-feet of water.

Figure 5

LOCATION OF PUBLIC COMMUNITY WATER SYSTEMS WITHIN BOX ELDER COUNTY

Bear River Basin



Legend

County boundary

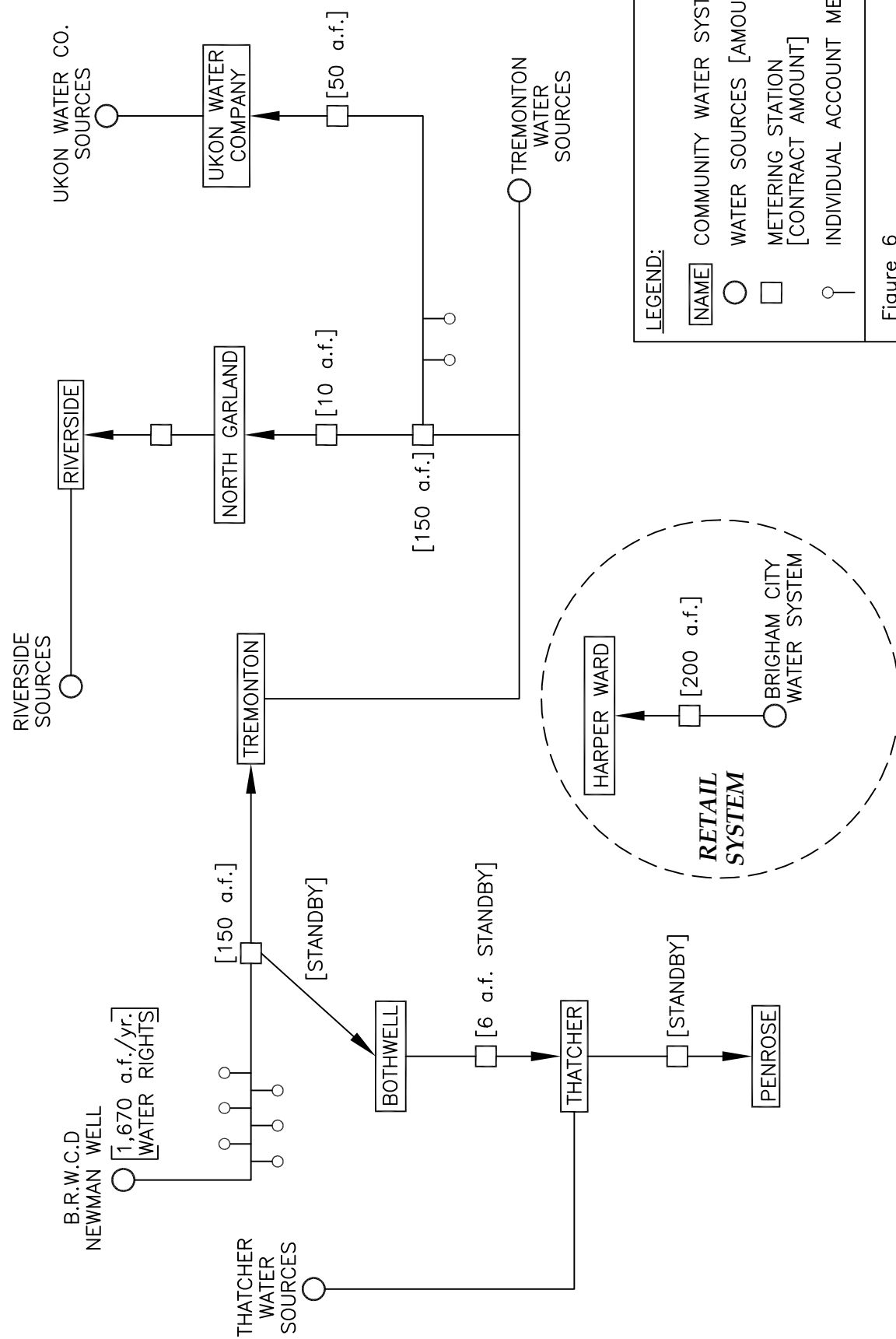
Hydrologic Basin Boundary

Roads



4 0 4 8 Miles

BEAR RIVER WATER CONSERVANCY DISTRICT WATER SERVICE AREA SCHEMATIC



LEGEND:

[NAME]	COMMUNITY WATER SYSTEM
○	WATER SOURCES [AMOUNT]
□	METERING STATION [CONTRACT AMOUNT]
⦿	INDIVIDUAL ACCOUNT METER

Figure 6

TABLE 1
BOX ELDER COUNTY
Maximum Potable Water Supplies for Public Community Systems

WATER SUPPLIER	Springs (Ac-Ft/Yr)	Wells (Ac-Ft/Yr)	Surface (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
BOX ELDER COUNTY				
Acme Water Co.	169.3	725.8	0.0	895.1
Bear River WCD - Harper Ward Retail	200.0	0.0	0.0	200.0
Bear River WCD - Other Retail Customers	0.0	1,669.5	0.0	1,669.5
Bear River WCD - Wholesale:				
Riverside - North Garland Water Co.	0.0	466.0	0.0	466.0
Thatcher-Penrose Service District	0.0	1,249.0	0.0	1,249.0
Tremonton Culinary Water	3,354.0	166.0	0.0	3,520.0
Ukon Water Co.	319.0	105.0	0.0	424.0
Beaver Dam Water Co.	378.0	0.0	0.0	378.0
Bothwell Cemetary and Water Corp.	0.0	403.1	0.0	403.1
Brigham City Municipal Water	7,864.0	7,095.0	0.0	14,959.0
Cedar Ridge Subdivision	0.0	338.0	0.0	338.0
Coleman Mobile Home Court	0.0	32.0	0.0	32.0
Corinne City Corp.	104.8	391.0	0.0	495.8
Deweyville Municipal Water System	274.0	185.0	0.0	459.0
Elwood Town	242.0	645.0	0.0	887.0
Five C's Trailer Court	0.0	36.0	0.0	36.0
Garland City Corp.	2,080.0	0.0	0.0	2,080.0
Honeyville Municipal Water System	300.0	2,500.0	0.0	2,800.0
Hot Springs Trailer Court	0.0	51.0	0.0	51.0
Mantua Culinary Water System	80.7	661.4	0.0	742.1
Marble Hills Subdivision	0.0	322.0	0.0	322.0
Perry City Water System	65.0	3,063.0	0.0	3,128.0
Plymouth Town	181.0	724.0	0.0	905.0
Portage Municipal Water System	48.0	162.0	0.0	210.0
South Willard Culinary Water	48.4	796.3	0.0	844.7
Sunset Park Water Co.	0.0	23.0	0.0	23.0
West Corinne Water Co.	726.0	1,129.0	0.0	1,855.0
Willard Municipal Water System	200.0	1,774.0	0.0	1,974.0
BOX ELDER CO. TOTALS	16,634.2	24,712.1	0.0	41,346.3

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

**TABLE 2
BOX ELDER COUNTY
WATER USE AND SUPPLY FOR PUBLIC COMMUNITY SYSTEMS**

WATER SUPPLIER	POTABLE USAGE						POTABLE PER CAPITA USAGE			MAXIMUM WATER SUPPLY AVAILABLE UNDER PRESENT CONDITIONS (Ac-Ft/Yr)	POTABLE ESTIMATED PEAK DAY VALUES				RELIABLE SYSTEM SOURCE CAPACITY UNDER PRESENT CONDITIONS (Ac-Ft/Yr)
	Residential Indoor Use (Ac-Ft/Yr)	Residential Outdoor Use (Ac-Ft/Yr)	Commercial Indoor and Outdoor Use (Ac-Ft/Yr)	Institutional Indoor and Outdoor Use (Ac-Ft/Yr)	Industrial/ Stockwater Indoor and Outdoor Use (Ac-Ft/Yr)	Total Potable M & I Use (Ac-Ft/Yr)	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)		Assumed Peaking Factor (PD/AD)	Peak Day Supply (MGD)	Peak Day Demand (MGD)	Peak Day Supply Over Demand (MGD)	
BOX ELDER COUNTY															
Acme Water Co.	65.2	113.9	1.8	10.2	21.8	212.9	820	0.260	231.8	895	2.2869	0.7990	0.4346	0.3644	391
- Harper Ward Retail	11.9	5.0	0.0	0.0	0.0	16.9	150	0.113	100.6	200	2.0088	0.1785	0.0303	0.1482	100
- Other Retail Customers	2.5	0.4	0.0	0.0	0.0	2.9	32	0.091	80.9	1,670	1.8894	1.4903	0.0049	1.4854	884
- Wholesale:															
Riverside - North Garland Water Co.	87.5	59.2	12.6	0.3	43.7	203.3	1,100	0.185	165.0	466	2.2006	0.4160	0.3994	0.0166	212
Thatcher-Penrose Service District	55.7	84.5	0.4	8.9	9.7	159.2	700	0.227	203.0	1,249	2.2567	1.1150	0.3207	0.7943	553
Tremonton Culinary Water	397.7	584.2	219.0	71.8	62.0	1,334.7	5,000	0.267	238.3	3,520	2.2927	3.1422	2.7317	0.4106	1,535
Ukon Water Co.	73.2	31.3	0.4	2.0	22.9	129.8	920	0.141	125.9	424	2.1078	0.3785	0.2442	0.1343	201
Beaver Dam Water Co.	4.9	13.8	0.0	0.0	0.0	18.7	61	0.307	273.7	378	2.3195	0.3374	0.0387	0.2987	163
Bothwell Cemetery and Water Corp.	31.8	67.6	0.0	1.9	15.3	116.6	400	0.292	260.2	403	2.3102	0.3598	0.2405	0.1194	174
Brigham City Municipal Water	1,352.0	2,222.6	473.2	688.3	288.8	5,024.9	17,000	0.296	263.9	14,959	2.3128	13.3536	10.3743	2.9793	6,468
Cedar Ridge Subdivision	7.9	13.1	0.4	0.0	0.0	21.4	100	0.214	191.0	338	2.2414	0.3017	0.0428	0.2589	151
Coleman Mobile Home Court	3.8	0.0	0.0	0.0	0.0	3.8	48	0.079	70.7	32	1.8010	0.0286	0.0061	0.0225	18
Corinne City Corp.	51.4	14.6	1.5	9.5	14.7	91.7	646	0.142	126.7	496	2.1102	0.4426	0.1727	0.2699	235
Deweyville Municipal Water System	27.8	51.7	0.0	1.0	6.1	86.6	350	0.247	220.9	459	2.2763	0.4097	0.1760	0.2338	202
Elwood Town	49.7	103.7	5.2	10.0	16.0	184.6	625	0.295	263.7	887	2.3126	0.7918	0.3811	0.4107	384
Five C's Trailer Court	4.0	2.5	0.0	0.0	0.0	6.5	50	0.130	116.0	36	2.0743	0.0321	0.0120	0.0201	17
Garland City Corp.	133.6	160.0	13.8	137.3	3.5	448.2	1,680	0.267	238.2	2,080	2.2926	1.8568	0.9173	0.9395	907
Honeyville Municipal Water System	99.4	301.1	31.8	28.6	37.8	498.7	1,250	0.399	356.1	2,800	2.3613	2.4995	1.0512	1.4483	1,186
Hot Springs Trailer Court	8.7	5.0	0.0	0.0	0.0	13.7	110	0.125	111.2	51	2.0557	0.0455	0.0251	0.0204	25
Mantua Culinary Water System	56.3	115.3	1.5	20.2	0.0	193.3	708	0.273	243.7	742	2.2973	0.6625	0.3964	0.2660	323
Marble Hills Subdivision	10.8	21.3	0.0	0.0	0.0	32.1	136	0.236	210.7	322	2.2655	0.2874	0.0649	0.2225	142
Perry City Water System	159.1	219.8	0.1	31.4	20.9	431.3	2,000	0.216	192.5	3,128	2.2434	2.7923	0.8637	1.9286	1,394
Plymouth Town	31.8	53.7	0.7	4.0	9.8	100.0	400	0.250	223.2	905	2.2786	0.8079	0.2034	0.6045	397
Portage Municipal Water System	20.0	5.3	1.0	22.5	1.5	50.3	250	0.201	179.6	210	2.2250	0.1875	0.0999	0.0876	94
South Willard Culinary Water	21.0	35.6	5.5	0.0	11.0	73.1	264	0.277	247.2	845	2.3001	0.7540	0.1501	0.6040	367
Sunset Park Water Co.	2.8	5.6	0.0	0.0	0.4	8.8	35	0.251	224.4	23	2.2799	0.0205	0.0179	0.0026	10
West Corinne Water Co.	107.0	133.0	3.3	1.0	722.8	967.1	1,345	0.719	641.9	1,855	2.4230	2.0918	2.0918	0.0000	967
Willard Municipal Water System	122.0	305.6	28.2	47.8	0.0	503.6	1,535	0.328	292.9	1,974	2.3313	1.7622	1.0481	0.7141	847
										see note					
BOX ELDER COUNTY TOTALS	2,999.5	4,729.4	800.4	1,096.7	1,308.7	10,934.7	37,715	0.290	258.8	41,346	2.3091	36.9091	22.5399	14.3692	18,348
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

* Note: Peak Day Demand exceeds the calculated Peak Day Supply. An assumption was made that in these cases the Peak Day Supply has been exactly met and should be set equal to the Peak Day Demand.

Although some systems may withdraw the maximum water supply available under present conditions, the hydrologic conditions will probably limit all systems collectively from withdrawing this quantity, as presented.

Bear River Water Conservancy District retails water to individual customers and wholesales water to the listed community systems.

A, B, C, D, E, F, H, and K

G=B+C+D+E+F

I=G/H

J=I*892.682

L=(2.5*J-49.4)/J

M=K*892.682/1000000; (except as provided in the note above)

N=H*J/L/1000000

O=M-N

P=(M/(L*J))*J*1120.22

These values are all input data.

This value represents only Potable M&I Water Use.

Average per capita potable water use.

Converts from Ac-Ft/Yr to GPD

The factor which when multiplied to the average per capita water use represents water use during peak demands.

Peak Day Supply of potable water based on maximum reliable source capacity converted to MGD). Where the calculated Peak Day Supply of potable water is less than the Peak Day Demand of Potable Water, this value was set equal to the Peak Day Demand of potable water.

Peak Day Demand on potable water based on the total potable M&I water use multiplied by the peaking factor

The amount of Peak Day Supply of potable water above the amount of the Peak Day Demand of potable water.

Reliable system source capacity represents that volume of water, which when divided by the average annual water per capita use, gives that population that can be reliably served by the system sources under peak day demand conditions.

Secondary water is another important aspect of total M&I use. **Table 3** gives the amount of secondary water used for various categories within the boundaries of the public community systems. In this portion of Box Elder County irrigation companies deliver a total of 1,535 acre-feet of secondary water.

TABLE 3
BOX ELDER COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems

WATER SUPPLIER	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Secondary Use (Ac-Ft/Yr)
BOX ELDER COUNTY					
Acme Water Co.	30.9	0.0	45.0	0.0	75.9
Bear River WCD - Harper Ward Retail	30.6	0.0	0.0	0.0	30.6
Bear River WCD - Other Retail Customers	6.6	0.0	0.0	0.0	6.6
Bear River WCD - Wholesale:					
Riverside - North Garland Water Co.	43.1	83.4	18.8	0.0	145.3
Thatcher-Penrose Service District	39.0	0.0	0.0	0.0	39.0
Tremonton Culinary Water	0.0	64.0	50.0	0.0	114.0
Ukon Water Co.	153.8	0.0	52.5	0.0	206.3
Beaver Dam Water Co.	0.0	0.0	0.0	0.0	0.0
Bothwell Cemetary and Water Corp.	16.6	0.0	12.5	0.0	29.1
Brigham City Municipal Water	88.3	0.0	312.5	0.0	400.8
Cedar Ridge Subdivision	0.0	0.0	0.0	0.0	0.0
Coleman Mobile Home Court	5.0	0.0	2.5	0.0	7.5
Corinne City Corp.	54.9	0.0	36.0	0.0	90.9
Deweyville Municipal Water System	13.3	0.0	25.0	0.0	38.3
Elwood Town	19.6	0.0	0.0	0.0	19.6
Five C's Trailer Court	0.0	0.0	0.0	0.0	0.0
Garland City Corp.	12.5	0.0	12.5	0.0	25.0
Honeyville Municipal Water System	0.0	30.0	3.1	0.0	33.1
Hot Springs Trailer Court	0.0	0.0	1.3	0.0	1.3
Mantua Culinary Water System	2.5	6.0	0.0	0.0	8.5
Marble Hills Subdivision	0.0	0.0	0.0	0.0	0.0
Perry City Water System	165.0	2.5	12.5	0.0	180.0
Plymouth Town	0.0	0.0	0.0	0.0	0.0
Portage Municipal Water System	30.1	0.0	0.0	0.0	30.1
South Willard Culinary Water	5.3	0.0	0.0	0.0	5.3
Sunset Park Water Co.	0.0	0.0	0.0	0.0	0.0
West Corinne Water Co.	21.7	0.0	2.0	0.0	23.7
Willard Municipal Water System	16.6	0.0	7.5	0.0	24.1
BOX ELDER COUNTY TOTALS	755.4	185.9	593.7	0.0	1,535.0

Note: Separate irrigation companies provide secondary water to the water supplier unless indicated by an *.

Table 4 gives the water use for public non-community system and private domestic systems. There is one self-supplied industry and several private domestic wells. Collectively, these uses amount to 1,156 acre-feet of potable water use and 1,030 acre-feet of secondary water use.

TABLE 4
BOX ELDER COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
BOX ELDER COUNTY						
Beaver Dam Church	0.0	0.0	0.0	0.0	0.0	7.5
Maddox Restaurant	9.0	22.0	0.0	0.0	31.0	0.0
Tri-Valley Truck Stop	0.0	7.0	0.0	0.0	7.0	0.0
Willard Bay State Park South	0.0	0.0	0.0	0.0	0.0	18.9
Willow Creek Water Co.	3.3	0.0	0.0	0.0	3.3	0.0
SELF-SUPPLIED INDUSTRIES*	0.0	0.0	0.0	14.7	14.7	1,003.6
PRIVATE DOMESTIC	1,100.0	0.0	0.0	0.0	1,100.0	0.0
BOX ELDER CO. TOTALS	1,112.3	29.0	0.0	14.7	1,156.0	1,030.0

*Nucor Steel Co.

Total potable M&I water use in the county is 12,091 acre-feet, while secondary use is 2,565 acre-feet; giving a total M&I water use of 14,656 acre-feet. Since the current population of this portion of Box Elder County is about 41,000, the total M&I per capita use is 319 gpcd. **Table 5** gives various per capita rates for public community systems. **Appendix A** shows the data for each public community system that is presented in the tables.

TABLE 5
BOX ELDER COUNTY
Average Per Capita M&I Water Use for all Public Community Systems

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.205	183
Residential Potable Plus Secondary Use	0.225	201
Total Potable Use	0.290	259
Total Potable Plus Secondary Use	0.331	295

Note: Total Potable categories include residential, commercial, institutional and industrial uses.

CACHE COUNTY M&I WATER SUPPLIES AND USES

The Bear River Basin encompasses all of Cache County, which includes the incorporated communities of Hyde Park, Hyrum, Lewiston, Logan, Mendon, Millville, Nibley, North Logan, Providence, Richmond, River Heights, Smithfield and Wellsville cities, as well as the towns of Amalga, Clarkston, Cornish, Newton, Paradise, and Trenton. Within this area are 24 public community systems, 22 public non-community systems, and five self-supplied industries. Utah State University is listed as a public non-community water system. They have their own supplies of water, as well as receiving additional water supplies from Logan City. Location of the public community systems in Cache County are shown in **Figure 7**.

Table 6 shows that the maximum annual water supply for public community systems in Cache County is 83,254 acre-feet: 25,722 acre-feet from springs, 56,098 acre-feet from wells, and 1,434 acre-feet from surface waters. The reliable system source capacity at 39,781 acre-feet, is 48 percent of the maximum annual water supply.

Table 7 shows the reliable system source capacity, along with a breakdown of the potable water use for each public community system. This table shows that for Cache County the current annual potable water use of 24,306 acre-feet is 61 percent of the reliable system source capacity.

**LOCATION OF PUBLIC COMMUNITY WATER SYSTEMS
WITHIN CACHE COUNTY**
Bear River Basin

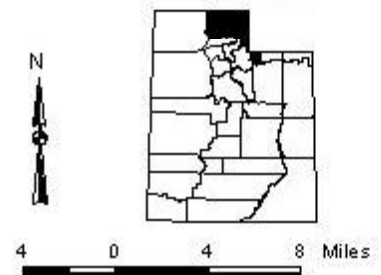


TABLE 6
CACHE COUNTY
Maximum Potable Water Supplies for Public Community Systems

WATER SUPPLIER	Springs (Ac-Ft/Yr)	Wells (Ac-Ft/Yr)	Surface (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
CACHE COUNTY				
Amalga Municipal Water System	0.0	1,373.0	0.0	1,373.0
Bensen Water Culinary District	0.0	328.0	0.0	328.0
Clarkston Municipal Water System	1,129.0	0.0	0.0	1,129.0
Cornish Municipal Water System	32.3	200.7	0.0	233.0
Goasind Spring Water Works Co.	788.0	0.0	0.0	788.0
High Creek Culinary Water System	145.0	0.0	0.0	145.0
Hyde Park Culinary Water System	362.0	2,259.0	0.0	2,621.0
Hyrum City Water System	1,126.0	10,078.0	0.0	11,204.0
Lewiston Culinary Water System	1,279.0	364.0	0.0	1,643.0
Logan City Water System	10,135.0	14,648.0	0.0	24,783.0
Menden Culinary Water System	250.0	361.0	0.0	611.0
Millville City Water	153.0	871.0	0.0	1,024.0
Newton Town Water	348.0	0.0	0.0	348.0
Nibley City	369.0	525.0	0.0	894.0
North Logan Culinary System	807.0	4,198.0	1,434.0	6,439.0
Paradise Town	97.0	314.0	0.0	411.0
Providence City Corp. Water	1,613.0	6,933.0	0.0	8,546.0
Richmond City	975.9	1,064.6	0.0	2,040.5
River Heights City Water System	0.0	2,850.0	0.0	2,850.0
Riverside Culinary Water Co.	0.0	224.0	0.0	224.0
Smithfield Municipal Water System	2,671.3	2,419.5	0.0	5,090.8
South Cove Water Supply	393.0	0.0	0.0	393.0
Trenton City	1,274.0	0.0	0.0	1,274.0
Wellsville City	1,774.3	7,087.0	0.0	8,861.3
CACHE COUNTY TOTALS	25,721.8	56,097.8	1,434.0	83,253.6

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

**TABLE 7
CACHE COUNTY
WATER USE AND SUPPLY FOR PUBLIC COMMUNITY SYSTEMS**

WATER SUPPLIER	POTABLE USAGE						POTABLE PER CAPITA USAGE			MAXIMUM WATER SUPPLY	POTABLE ESTIMATED PEAK DAY VALUES				RELIABLE SYSTEM SOURCE CAPACITY UNDER PRESENT CONDITIONS (Ac-Ft/Yr)
	Residential Indoor Use (Ac-Ft/Yr)	Residential Outdoor Use (Ac-Ft/Yr)	Commercial Indoor and Outdoor Use (Ac-Ft/Yr)	Institutional Indoor and Outdoor Use (Ac-Ft/Yr)	Industrial/ Stockwater Indoor and Outdoor Use (Ac-Ft/Yr)	Total Potable M & I Use (Ac-Ft/Yr)	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)	AVAILABLE UNDER PRESENT CONDITIONS (Ac-Ft/Yr)	Assumed Peaking Factor (PD/AD)	Peak Day Supply (MGD)	Peak Day Demand (MGD)	Peak Day Supply Over Demand (MGD)	
CACHE COUNTY															
Amalga Municipal Water System	32.1	61.1	7.8	3.1	414.3	518.4	410	1.264	1,128.7	1,373	2.4562	1.2257	1.1367	0.0890	559
Bensen Water Culinary District	43.9	30.7	0.0	0.3	41.7	116.6	560	0.208	185.9	328	2.2342	0.2928	0.2326	0.0602	147
Clarkston Municipal Water System	52.5	278.5	0.4	20.9	6.8	359.1	670	0.536	478.5	1,129	2.3968	1.0078	0.7683	0.2395	471
Cornish Municipal Water System	19.6	54.2	0.0	14.0	6.5	94.3	250	0.377	336.7	233	2.3533	0.2080	0.1981	0.0099	99
Goasind Spring Water Works Co.	4.7	1.5	0.0	0.0	0.0	6.2	60	0.103	92.2	788	1.9645	0.7034	0.0109	0.6926	401
High Creek Culinary Water System	6.7	11.0	0.0	0.0	8.7	26.4	85	0.311	277.3	145	2.3218	0.1294	0.0547	0.0747	62
Hyde Park Culinary Water System	235.2	154.2	14.8	9.7	9.2	423.1	3,000	0.141	125.9	2,621	2.1076	2.3397	0.7960	1.5437	1,244
Hyrum City Water System *	485.0	191.1	133.4	163.8	1,285.2	2,258.5	6,185	0.365	326.0	11,204	2.3485	10.0016	4.7348	5.2668	4,771
Lewiston Culinary Water System	136.1	161.8	18.7	15.4	236.9	568.9	1,736	0.328	292.5	1,643	2.3311	1.4667	1.1839	0.2828	705
Logan City Water System	3,418.2	7,129.0	2,443.1	595.6	171.8	13,757.7	43,594	0.316	281.7	24,783	2.3246	28.5496	28.5496 *	0.0000	13,758
Menden Culinary Water System	63.0	37.0	0.0	1.0	3.7	104.7	804	0.130	116.2	611	2.0750	0.5454	0.1939	0.3515	294
Millville City Water	105.9	109.7	0.3	52.1	37.2	305.2	1,350	0.226	201.8	1,024	2.2552	0.9141	0.6144	0.2997	454
Newton Town Water*	54.1	49.3	0.4	3.4	22.1	129.3	690	0.187	167.3	348	2.2047	0.3107	0.2545	0.0562	158
Nibley City	149.0	99.1	1.3	38.0	28.6	316.0	1,900	0.166	148.5	894	2.1673	0.7981	0.6114	0.1867	413
North Logan Culinary System	501.8	346.9	117.2	50.4	14.9	1,031.2	6,400	0.161	143.8	6,439	2.1565	5.7480	1.9852	3.7628	2,986
Paradise Town	50.6	43.7	0.7	0.7	12.0	107.7	645	0.167	149.1	411	2.1686	0.3669	0.2085	0.1584	190
Providence City Corp. Water	361.5	651.9	0.5	137.8	7.3	1,159.0	4,610	0.251	224.4	8,546	2.2799	7.6289	2.3588	5.2700	3,748
Richmond City	152.0	119.9	18.2	45.2	47.8	383.1	1,938	0.198	176.5	2,041	2.2201	1.8215	0.7592	1.0623	919
River Heights City Water System	116.0	448.7	0.0	11.5	0.0	576.2	1,480	0.389	347.5	2,850	2.3579	2.5441	1.2128	1.3313	1,209
Riverside Culinary Water Co.	7.1	12.5	0.0	0.0	0.0	19.6	90	0.218	194.4	224	2.2459	0.2000	0.0393	0.1607	100
Smithfield Municipal Water System*	581.1	483.4	160.2	147.8	8.6	1,381.1	7,420	0.186	166.2	5,091	2.2027	4.5445	2.7157	1.8288	2,311
South Cove Water Supply	5.7	5.8	0.0	0.4	0.0	11.9	73	0.163	145.5	393	2.1605	0.3508	0.0230	0.3279	182
Trenton City	39.2	19.4	0.5	6.5	26.8	92.4	500	0.185	165.0	1,274	2.2005	1.1373	0.1815	0.9558	579
Wellsville City	235.2	192.2	56.8	66.8	8.2	559.2	3,000	0.186	166.4	8,861	2.2031	7.9103	1.0998	6.8106	4,022
										see note					
CACHE COUNTY TOTALS	6,856.2	10,692.6	2,974.3	1,384.4	2,398.3	24,305.8	87,450	0.278	248.1	83,254	2.3009	74.3190	49.9233	24.3956	39,781
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

* Note: Peak Day Demand exceeds the calculated Peak Day Supply. An assumption was made that in these cases the Peak Day Supply has been exactly met and should be set equal to the Peak Day Demand.

Although some systems may withdraw the maximum water supply available under present conditions, the hydrologic conditions will probably limit all systems collectively from withdrawing this quantity, as presented.

A, B, C, D, E, F, H, and K

G=B+C+D+E+F

I=G/H

J=I*892.682

L=(2.5*J-49.4)/J

M=K*892.682/1000000; (except as provided in the note above)

N=H*J*L/1000000

O=M-N

P={M/(L*J)}*J*1120.22

These values are all input data.

This value represents only Potable M&I Water Use.

Average per capita potable water use.

Converts from Ac-Ft/Yr to GPD

The factor which when multiplied to the average per capita water use represents water use during peak demands.

Peak Day Supply of potable water based on maximum reliable source capacity converted to MGD). Where the calculated Peak Day Supply of potable water is less than the Peak Day Demand of Potable Water, this value was set equal to the Peak Day Demand of potable water.

Peak Day Demand on potable water based on the total potable M&I water use multiplied by the peaking factor

The amount of Peak Day Supply of potable water above the amount of the Peak Day Demand of potable water.

Reliable system source capacity represents that volume of water, which when divided by the average annual water per capita use, gives that population that can be reliably served by the system sources under peak day demand conditions.

Secondary water is another important aspect of total M&I use. **Table 8** gives the annual amount of secondary water used for various categories within the boundaries of the public community systems. In Cache County, several separate irrigation companies serve secondary water to customers within public communities. Only Hyrum, Newton, and Smithfield municipalities operate their own secondary water systems. Total secondary water use is 3,472 acre-feet

TABLE 8
CACHE COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems

WATER SUPPLIER	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Secondary Use (Ac-Ft/Yr)
CACHE COUNTY					
Amalga Municipal Water System	7.4	0.0	0.0	0.0	7.4
Bensen Water Culinary District	48.4	0.0	0.0	0.0	48.4
Clarkston Municipal Water System	0.0	0.0	0.0	0.0	0.0
Cornish Municipal Water System	3.0	0.0	6.0	0.0	9.0
Goasland Spring Water Works Co.	6.0	0.0	0.0	0.0	6.0
High Creek Culinary Water System	1.0	0.0	0.0	0.0	1.0
Hyde Park Culinary Water System	189.8	0.0	26.0	0.0	215.8
Hyrum City Water System *	759.2	0.0	101.0	0.0	860.2
Lewiston Culinary Water System	27.5	0.0	8.0	0.0	35.5
Logan City Water System	0.0	173.0	295.9	0.0	468.9
Menden Culinary Water System	144.0	0.0	26.0	0.0	170.0
Millville City Water	35.0	0.0	30.0	0.0	65.0
Newton Town Water*	86.0	0.0	26.0	0.0	112.0
Nibley City	46.7	0.0	0.0	0.0	46.7
North Logan Culinary System	173.1	0.0	62.0	0.0	235.1
Paradise Town	187.6	0.0	26.0	0.0	213.6
Providence City Corp. Water	71.3	0.0	0.0	0.0	71.3
Richmond City	144.5	0.0	40.0	0.0	184.5
River Heights City Water System	11.7	0.0	4.0	0.0	15.7
Riverside Culinary Water Co.	0.0	0.0	0.0	0.0	0.0
Smithfield Municipal Water System*	286.4	0.0	246.1	0.0	532.5
South Cove Water Supply	6.0	0.0	4.0	0.0	10.0
Trenton City	58.0	0.0	6.0	0.0	64.0
Wellsville City	99.0	0.0	0.0	0.0	99.0
CACHE COUNTY TOTALS	2,391.6	173.0	907.0	0.0	3,471.6

Note: Separate irrigation companies provide secondary water to the water supplier unless indicated by an '*'.

Table 9 gives annual water use for public non-community systems, self-supplied industries, and private domestic systems. All of these uses amount to 4,973 acre-feet of potable and 880 acre-feet of secondary water use.

TABLE 9
CACHE COUNTY
Water Use for Public Non-Community Systems,
Self-Supplied Industries and Private Domestic Systems

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
CACHE COUNTY						
Beaver Mtn. Winter Sports	0.0	4.9	0.0	0.0	4.9	0.0
Buttars Tractor	0.0	0.5	0.0	0.0	0.5	0.0
Chrysler Dodge Country	0.0	1.5	0.0	0.0	1.5	0.0
Forest Service Facilities:						
Bridger Picnic Area	0.0	0.0	0.9	0.0	0.9	0.0
Card Campground (CG)	0.0	0.0	0.1	0.0	0.1	0.0
Chokecherry CG	0.0	0.0	0.1	0.0	0.1	0.0
Dewitt Campground	0.0	0.0	0.1	0.0	0.1	0.0
Lewis M. Turner CG	0.0	0.0	0.7	0.0	0.7	0.0
Lodge Campground	0.0	0.0	0.1	0.0	0.1	0.0
Guinavah-Malibu CG	0.0	0.0	15.0	0.0	15.0	0.0
Pioneer-Shenoah CG	0.0	0.0	0.2	0.0	0.2	0.0
Preston Valley CG	0.0	0.0	0.8	0.0	0.8	0.0
Red Banks Campground	0.0	0.0	0.1	0.0	0.1	0.0
Smithfield Canyon CG	0.0	0.0	0.1	0.0	0.1	0.0
Spring Hollow CG	0.0	0.0	0.2	0.0	0.2	0.0
Tony Grove Lake CG-South	0.0	0.0	4.1	0.0	4.1	0.0
Hardware Ranch	0.0	0.0	11.0	0.0	11.0	0.0
Hollow Road N. Water Co.	9.2	0.6	0.0	0.1	9.9	0.0
Juniper Inn	0.0	1.5	0.0	0.0	1.5	0.0
Lomia LDS Girls Camp	0.0	0.0	8.9	0.0	0.0	0.0
Utah State University	0.0	0.0	1,876.0	0.0	1,876.0	876.0
Zollinger Warehouse	0.0	1.0	0.0	0.0	1.0	0.0
SELF-SUPPLIED INDUSTRIES*	0.0	0.0	0.0	844.2	844.2	3.7
PRIVATE DOMESTIC SYSTEMS	2,200.0	0.0	0.0	0.0	2,200.0	0.0
CACHE COUNTY TOTALS	2,209.2	10.0	1,918.4	844.3	4,973.0	879.7

*Dairy Farmers; Gossner Foods, Inc.; Miller E.A.; Pepperidge Farms; Caspers Ice Cream

Total potable M&I water use in the county is about 29,279 acre-feet, while non-potable use is 4,351 acre-feet; giving a total M&I water use of 33,630 acre-feet. Since the current population of Cache County is about 87,440 the total M&I per capita use is 343 gpcd. **Table 10** gives various per capita rates for public community systems. **Appendix B** shows the data for each public community system that is presented in the tables.

TABLE 10
CACHE COUNTY
Average Per Capita M&I Water Use for all Public Community Systems

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.201	179
Residential Potable Plus Secondary Use	0.228	204
Total Potable Use	0.278	248
Total Potable Plus Secondary Use	0.318	284

Note: Total Potable categories include residential, commercial, institutional and industrial uses.

RICH COUNTY M&I WATER SUPPLIES AND USES

The Bear River Basin encompasses all of Rich County, which includes the incorporated communities of Garden City, Laketown, Randolph, and Woodruff. Within this area are five public community systems and nine public non-community systems. Location of the public community systems are shown in **Figure 8**.

Table 11 shows that the maximum annual water supply for public community systems in Rich County is 3,759 acre-feet; 2,423 acre-feet from springs and 1,336 acre-feet from wells. The reliable system source capacity is 1,692 acre-feet, less than half the maximum supply.

TABLE 11
RICH COUNTY
Potable Water Supplies for Public Community Systems

WATER SUPPLIER	Springs (Ac-Ft/Yr)	Wells (Ac-Ft/Yr)	Surface (Ac-Ft/Yr)	Total (Ac-Ft/Yr)
RICH COUNTY				
Garden City Water System	1,890.4	0.0	0.0	1,890.4
Laketown City Water System	354.9	0.0	0.0	354.9
Mountain Meadow Park Imp. District	0.0	724.0	0.0	724.0
Randolph City	177.4	419.4	0.0	596.8
Woodruff Culinary Water System	0.0	193.0	0.0	193.0
RICH COUNTY TOTALS	2,422.7	1,336.4	0.0	3,759.1

Note: All values represent maximum system source capacities limited by water rights, hydrologic constraints, and/or system constraints.

Table 12 shows the reliable system source capacity, as well as a breakdown of the potable water use for each public community system. This table shows that for Rich County the total current annual potable water use of 824 acre-feet is a little less than one half of the reliable supply of 1,692 acre-feet.

Figure 8

LOCATION OF PUBLIC COMMUNITY WATER SYSTEMS WITHIN RICH COUNTY

Bear River Basin

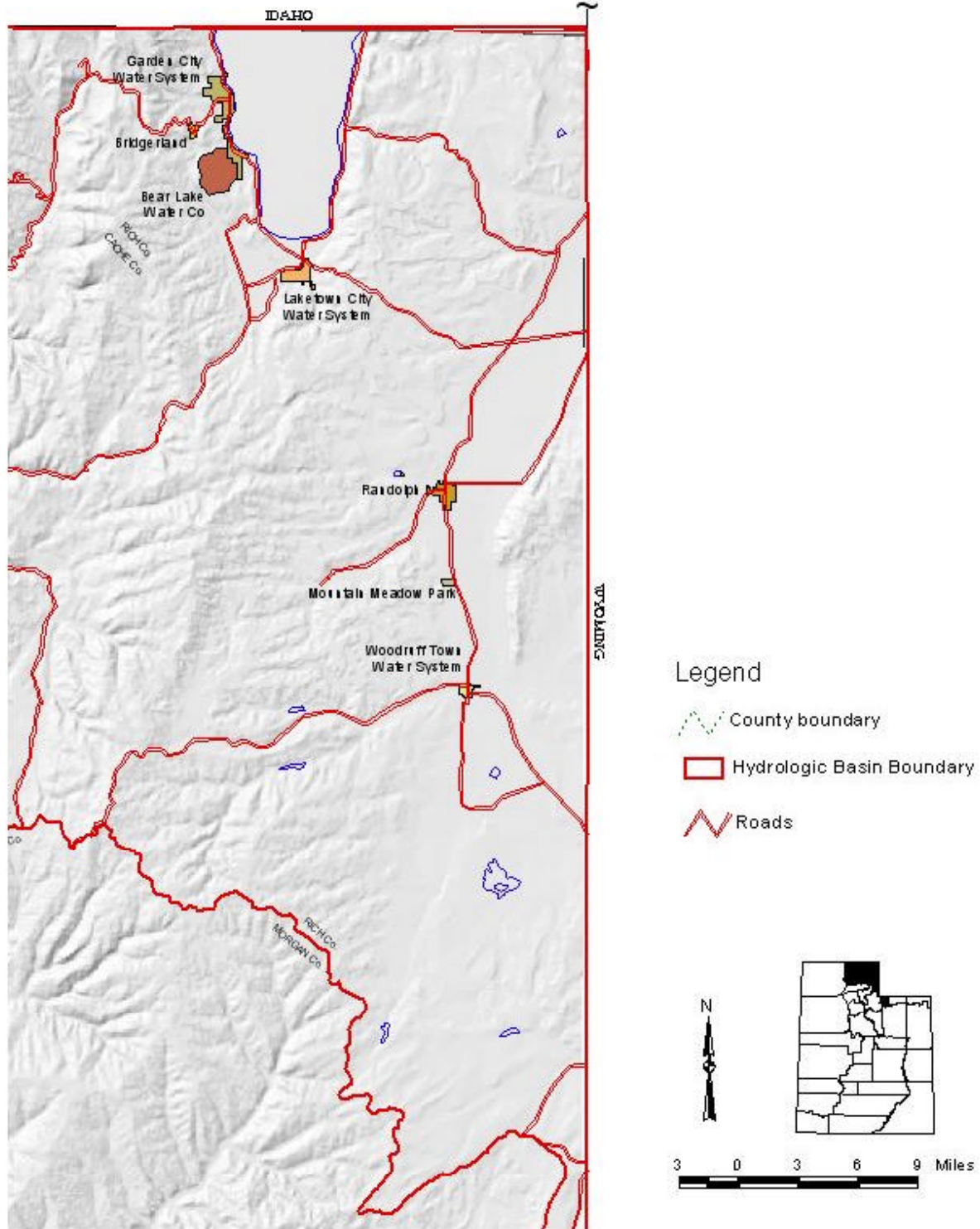


TABLE 12
RICH COUNTY
WATER USE AND SUPPLY FOR PUBLIC COMMUNITY SYSTEMS

WATER SUPPLIER	POTABLE USAGE						POTABLE PER CAPITA USAGE			MAXIMUM WATER SUPPLY	POTABLE ESTIMATED PEAK DAY VALUES				RELIABLE SYSTEM SOURCE CAPACITY UNDER PRESENT CONDITIONS
	Residential Indoor Use (Ac-Ft/Yr)	Residential Outdoor Use (Ac-Ft/Yr)	Commercial Indoor and Outdoor Use (Ac-Ft/Yr)	Institutional Indoor and Outdoor Use (Ac-Ft/Yr)	Industrial/ Stockwater Indoor and Outdoor Use (Ac-Ft/Yr)	Total Potable M & I Use (Ac-Ft/Yr)	Population	Average Per Capita Water Use (Ac-Ft/Yr)	Average Per Capita Water Use (GPCPD)	AVAILABLE UNDER PRESENT CONDITIONS (Ac-Ft/Yr)	Assumed Peaking Factor (PD/AD)	Peak Day Supply (MGD)	Peak Day Demand (MGD)	Peak Day Supply Over Demand (MGD)	
RICH COUNTY															
Garden City Water System	29.1	67.0	140.6	14.7	0.0	251.4	225	1.117	997.4	1,890	2.4505	1.6875	0.5499	1.1376	771
Laketown City Water System	28.6	195.3	1.1	6.0	5.6	236.6	340	0.696	621.2	355	2.4205	0.5112	0.5112 *	0.0000	237
Mountain Meadow Park Imp. District	6.7	5.0	0.0	4.6	0.0	16.3	80	0.204	181.9	724	2.2284	0.6463	0.0324	0.6139	325
Randolph City	42.0	216.5	4.6	13.1	0.0	276.2	500	0.552	493.1	597	2.3998	0.5917	0.5917 *	0.0000	276
Woodruff Culinary Water System	11.8	24.5	1.7	5.1	0.0	43.1	140	0.308	274.8	193	2.3202	0.1723	0.0893	0.0830	83
										see note					
RICH COUNTY TOTALS	118.2	508.3	148.0	43.5	5.6	823.6	1,285	0.641	572.2	3,759	2.4137	3.3557	1.7746	1.5811	1,692
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

* Note: Peak Day Demand exceeds the calculated Peak Day Supply. An assumption was made that in these cases the Peak Day Supply has been exactly met and should be set equal to the Peak Day Demand.

Although some systems may withdraw the maximum water supply available under present conditions, the hydrologic conditions will probably limit all systems collectively from withdrawing this quantity, as presented.

A, B, C, D, E, F, H, and K

G=B+C+D+E+F

I=G/H

J=I*892.682

L=(2.5*J-49.4)/J

M=K*892.682/1000000; (except as provided in the note above)

N=H*J*L/1000000

O=M-N

P=(M/(L*J))*J*1120.22

These values are all input data.

This value represents only Potable M&I Water Use.

Average per capita potable water use.

Converts from Ac-Ft/Yr to GPD

The factor which when multiplied to the average per capita water use represents water use during peak demands.

Peak Day Supply of potable water based on maximum reliable source capacity converted to MGD). Where the calculated Peak Day Supply of potable water is less than the Peak Day Demand of Potable Water, this value was set equal to the Peak Day Demand of potable water.

Peak Day Demand on potable water based on the total potable M&I water use multiplied by the peaking factor

The amount of Peak Day Supply of potable water above the amount of the Peak Day Demand of potable water.

Reliable system source capacity represents that volume of water, which when divided by the average annual water per capita use, gives that population that can be reliably served by the system sources under peak day demand conditions.

Secondary water is another important aspect of total M&I water use. **Table 13** shows the amount of secondary water use for public community systems. In Rich County, separate irrigation companies supply secondary water. The total secondary use for the county is 185 acre-feet.

TABLE 13
RICH COUNTY
Secondary (Non-Potable) Water Use Within Public Community Systems

WATER SUPPLIER	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Secondary Use (Ac-Ft/Yr)
RICH COUNTY					
Garden City Water System	1.5	137.5	0.0	0.0	139.0
Laketown City Water System	13.7	0.0	5.5	0.0	19.2
Mountain Meadow Park Imp. District	0.0	0.0	0.0	0.0	0.0
Randolph City	0.0	0.0	18.0	0.0	18.0
Woodruff Culinary Water System	4.5	0.0	4.0	0.0	8.5
RICH COUNTY TOTAL	19.7	137.5	27.5	0.0	184.7

Note: Separate irrigation companies provide secondary water to the water supplier unless indicated by an '*'.

Table 14 gives the water use for public non-community systems and private domestic systems. Bear Lake State Park facilities and several summer home developments around Bear Lake are among the nine listed non-community systems. There are no self-supplied industries in Rich County. However, there are several private residential wells. All these uses amount to about 393 acre-feet of potable water.

Total potable M&I water use in the county is about 1,216 acre-feet, while non-potable water use is 185 acre-feet, giving a total M&I water use of 1,401 acre-feet

for Rich County. Since the current population of Rich County is about 1,835 the total M&I per capita use in Rich County is about 592 gpcd. **Table 14** gives various per capita rates for public community systems. **Appendix C** shows the data for each public community water system that is presented in the tables.

**TABLE 14
RICH COUNTY
WATER USE FOR PUBLIC NON-COMMUNITY SYSTEMS,
SELF-SUPPLIED INDUSTRIES AND PRIVATE DOMESTIC SYSTEMS**

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
RICH COUNTY						
Bear Lake Rest Stop	0.0	0.0	0.1	0.0	0.1	0.0
Bear Lake Water Company	110.5	0.0	0.0	0.0	110.5	0.0
Bridgerland Village	7.4	0.0	0.0	0.0	7.4	0.0
Edge of Eden Subdivision	8.0	0.0	0.0	0.0	8.0	0.0
Forest Service Systems:						0.0
Monte Cristo Campground	0.0	0.0	0.6	0.0	0.6	0.0
Sunrise Campground	0.0	0.0	0.1	0.0	0.1	0.0
State Park Systems:						0.0
Rendezvous Beach	5.5	0.0	48.4	0.0	53.9	0.0
South Eden State Park	0.0	0.0	0.9	0.0	0.9	0.0
South Bear Lake	11.1	0.0	0.0	0.0	11.1	0.0
SELF-SUPPLIED INDUSTRIES *	0.0	0.0	0.0	0.0	0.0	0.0
PRIVATE DOMESTIC SYSTEMS	200.0	0.0	0.0	0.0	200.0	0.0
RICH COUNTY TOTALS	342.5	0.0	50.1	0.0	392.6	0.0

*There are no self-supplied industries in Rich Co.

TABLE 15
RICH COUNTY
Average Per Capita M&I Water Use for all Public Community Systems

CATEGORY	Average Per Capita Use (Ac-Ft/Yr)	Average Per Capita Use (GPCD)
Residential Potable Use	0.488	435
Residential Potable Plus Secondary Use	0.503	449
Total Potable Use	0.641	572
Total Potable Plus Secondary Use	0.785	701

Note: Total Potable categories include residential, commercial, institutional and industrial uses.

SUMMIT COUNTY M&I WATER SUPPLIES AND USES

The Bear River Basin portion of Summit County does not include any incorporated communities or public community water systems. However, there are a total of 19 public non-community water systems. **Table 16** shows the water use for each of these systems. There are no self-supplied industries and no private domestic wells in this portion of Summit County. The combined potable water use of 38 acre-feet and secondary (non-potable) water use of 100 acre-feet results in a total water use of 138 acre-feet.

**TABLE 16
SUMMIT COUNTY
WATER USE FOR PUBLIC NON-COMMUNITY SYSTEMS**

Non-Community System	POTABLE USAGE					SECONDARY USE (Ac-Ft/Yr)
	Residential Use (Ac-Ft/Yr)	Commercial Use (Ac-Ft/Yr)	Institutional Use (Ac-Ft/Yr)	Industrial/ Stockwater Use (Ac-Ft/Yr)	Total Potable Use (Ac-Ft/Yr)	
Bear River Lodge	0.0	1.5	0.0	0.0	1.5	0.0
Boy Scouts of America Sites:						
Bear Lake Aquatics Camp	0.0	0.0		0.0	0.0	0.0
Camp Evergreen	0.0	0.0	4.0	0.0	4.0	0.0
Camp Frontier	0.0	0.0	4.4	0.0	4.4	0.0
Camp Steiner	0.0	0.0	5.3	0.0	5.3	0.0
Camp Tomahawk	0.0	0.0	3.7	0.0	3.7	0.0
Carter Creek (HAFB Retreat)	0.0	0.0	0.1	0.0	0.1	0.0
Christmas Meadows Cabins	1.5	0.0	0.0	0.0	1.5	0.0
Forest Service Systems:						
Bear River Administration Site	0.0	0.0	2.0	0.0	2.0	0.0
Bear River Campground (CG)	0.0	0.0	0.1	0.0	0.1	0.0
Beaver View CG	0.0	0.0	0.1	0.0	0.1	0.0
Christmas Meadows CG	0.0	0.0	0.1	0.0	0.1	0.0
East Fork Bear River CG	0.0	0.0	0.1	0.0	0.1	0.0
Hayden Fork CG	0.0	0.0	0.1	0.0	0.1	0.0
Stillwater CG	0.0	0.0	0.2	0.0	0.2	0.0
Sulphur CG	0.0	0.0	0.2	0.0	0.2	0.0
Manorland Water District #1	6.0	0.0	0.0	0.0	6.0	0.0
Uintalands Association	8.9	0.0	0.0	0.0	8.9	100.0
SELF-SUPPLIED INDUSTRIES	0.0	0.0	0.0	0.0	0.0	0.0
PRIVATE DOMESTIC	0.0	0.0	0.0	0.0	0.0	0.0
SUMMIT COUNTY TOTALS	16.4	1.5	20.4	0.0	38.3	100.0

